

Napa County Groundwater Sustainability Agency

Monitoring Network, Data Gaps, and Future Implementation

September 12, 2024



**Luhdorff &
Scalmanini**
Consulting Engineers





Outline

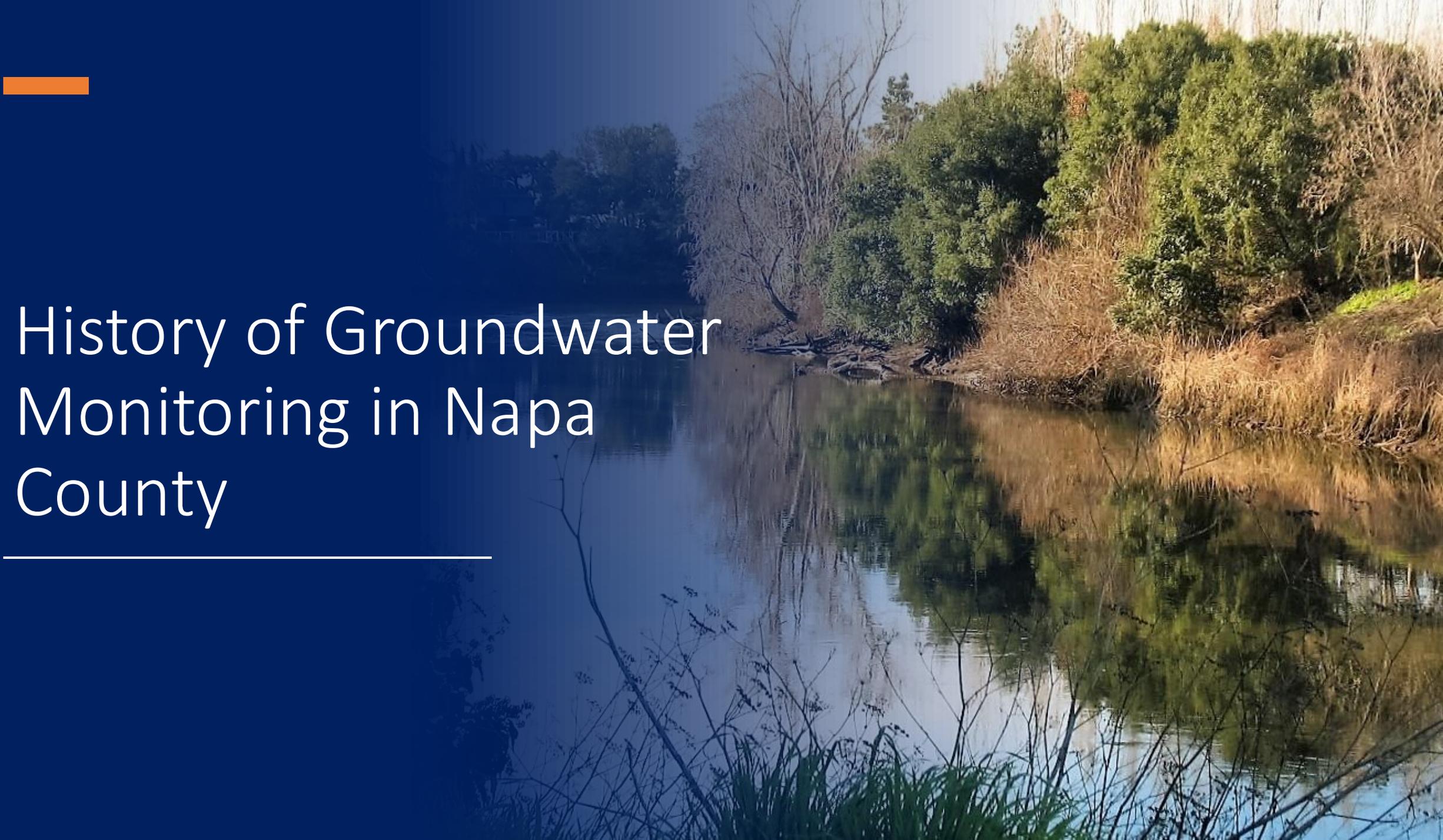
History of Groundwater Monitoring
in Napa County

Current Monitoring Networks

Questions and Discussion

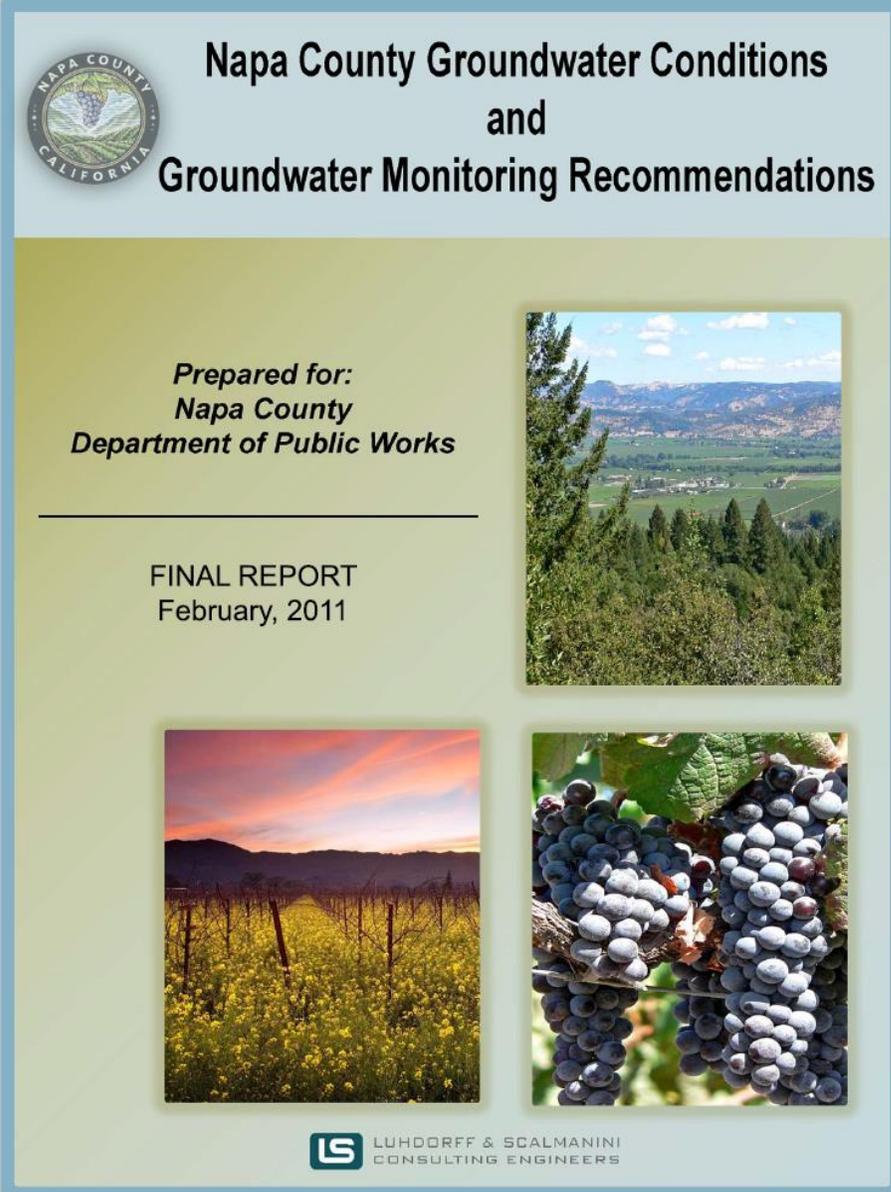


History of Groundwater Monitoring in Napa County



Pre-SGMA Monitoring

- Groundwater, surface water, and their interconnection, are recognized as important natural resources across Napa County.
- An expansion of the groundwater monitoring network was developed in 2011.
- An update to the network and conditions was published in 2013.
- Napa County annual reporting began in 2014, pre-SGMA.
- Data gaps from spatial, temporal, well construction information, and water quality were identified.



The image shows the cover of a report titled "Napa County Groundwater Conditions and Groundwater Monitoring Recommendations". The cover features the Napa County seal in the top left corner. The title is prominently displayed in the top right. Below the title, it states "Prepared for: Napa County Department of Public Works". A horizontal line separates this from the text "FINAL REPORT February, 2011". The cover is decorated with three photographs: a landscape view of a valley with mountains in the background, a vineyard at sunset, and a close-up of a bunch of dark grapes. At the bottom right, the logo for "LUHDOORFF & SCALMANINI CONSULTING ENGINEERS" is visible.

 **Napa County Groundwater Conditions
and
Groundwater Monitoring Recommendations**

*Prepared for:
Napa County
Department of Public Works*

FINAL REPORT
February, 2011



 **LUHDOORFF & SCALMANINI
CONSULTING ENGINEERS**

SGMA Monitoring (GSP Section 5)

- Napa County leveraged decades of groundwater monitoring data as the basis for the GSP monitoring networks.
- Increased to nine (9) monitoring networks (each with a specific objective) with ten (10) distinct measurement types.

Monitoring Networks	Measurement Type	Total			GSP-Specific	
		County	Napa Valley Subbasin	RMS	Supplemental	Planned
Groundwater Level	GW Levels	116	81	33	40	--
Groundwater Storage	GW Levels	--	27	--	27	--
	NVIHM Model	--	1	1	--	--
Land Subsidence	GW Levels	--	15	15	--	--
	Benchmark Monitoring	--	8	5	3	--
	InSAR	--	1	--	--	--
Stream Stage and Stream Discharge	Stream Stage and Stream Discharge	--	5	--	13	--
	Stream Watch	39	32	--	--	Yes
	Flood Control	28	16	--	16	--
Interconnected Surface Water – Groundwater	GW Levels	--	32	8	24	--
	NVIHM Model	--	2	2	--	--
GDE Monitoring	GW Level	--	33	--	33	--
	Stream Habitat	--	1	--	5	1
	Remote Sensing	--	10	--	10	--
Groundwater Quality	GW Quality	1,532 ¹	37	21	16	--
Seawater Intrusion	Chloride testing	--	18	11	7	--
Surface Water Quality	SW Quality	--	6	--	6	--



SGMA Data Gaps – Monitoring Network

- Monitoring Network Data Gaps:
 - Spatial distribution of wells.
 - Screening in single aquifer for monitoring.
 - Additional characterization of brackish water occurrence and gradient.
 - Number of surface water gages.

Addressing Monitoring Data Gaps

- Installation and recruitment of wells.
- Review construction information.
- Increase seawater intrusion sampling.
- Continue work on surface water gaging.



SGMA Data Gaps – Hydrogeologic

- Hydrogeologic Data Gaps:
 - Influence of highly heterogeneous properties of Quaternary deposits.
 - The role of older geologic formations as aquifers.
 - Degree to which brackish water in lower Napa River Watershed influences groundwater quality.

How Hydrogeologic Data Gaps are being Addressed:

- The Napa Valley Integrated Hydrologic Model refinements include geologic refinements to better characterize the heterogeneous properties of alluvium and how older geologic units may act as aquifers and
- Increased groundwater quality sampling in dual-completion monitoring wells that are within the tidal influence zone.



Current Monitoring Networks



Groundwater Levels

Napa County Monitoring Networks

Groundwater Levels

Groundwater Storage

Land Subsidence

Stream Stage and Discharge

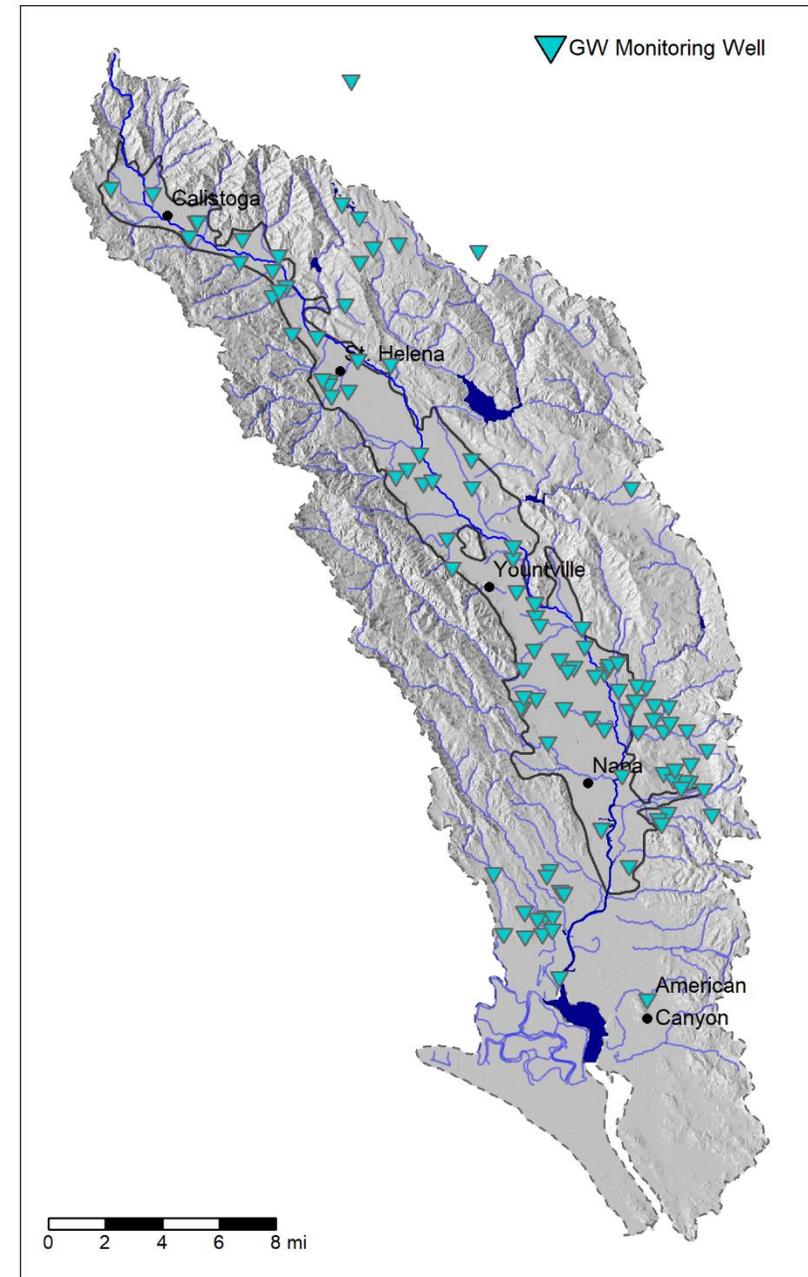
Interconnected SW-GW

GDE Monitoring

Groundwater Quality

Seawater Intrusion

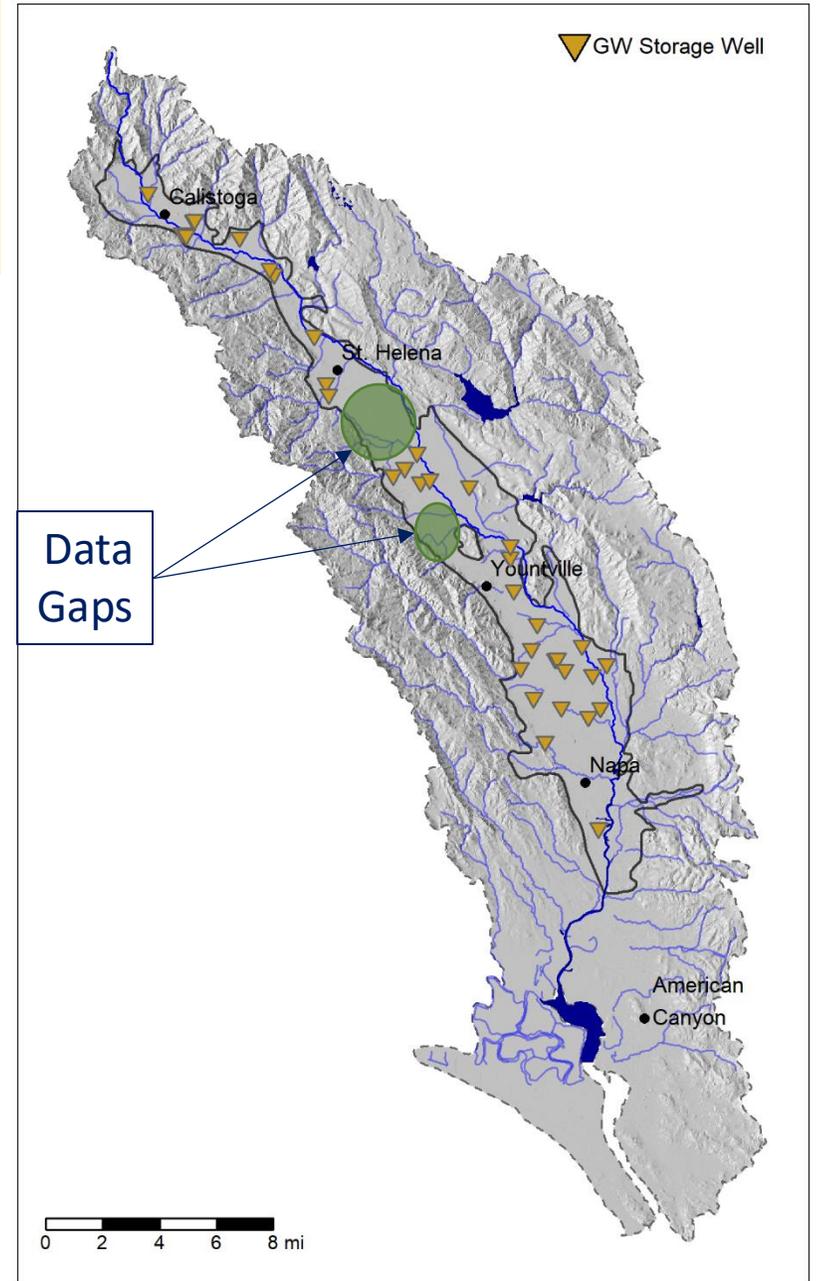
Surface Water Quality



Groundwater Levels

Groundwater Storage

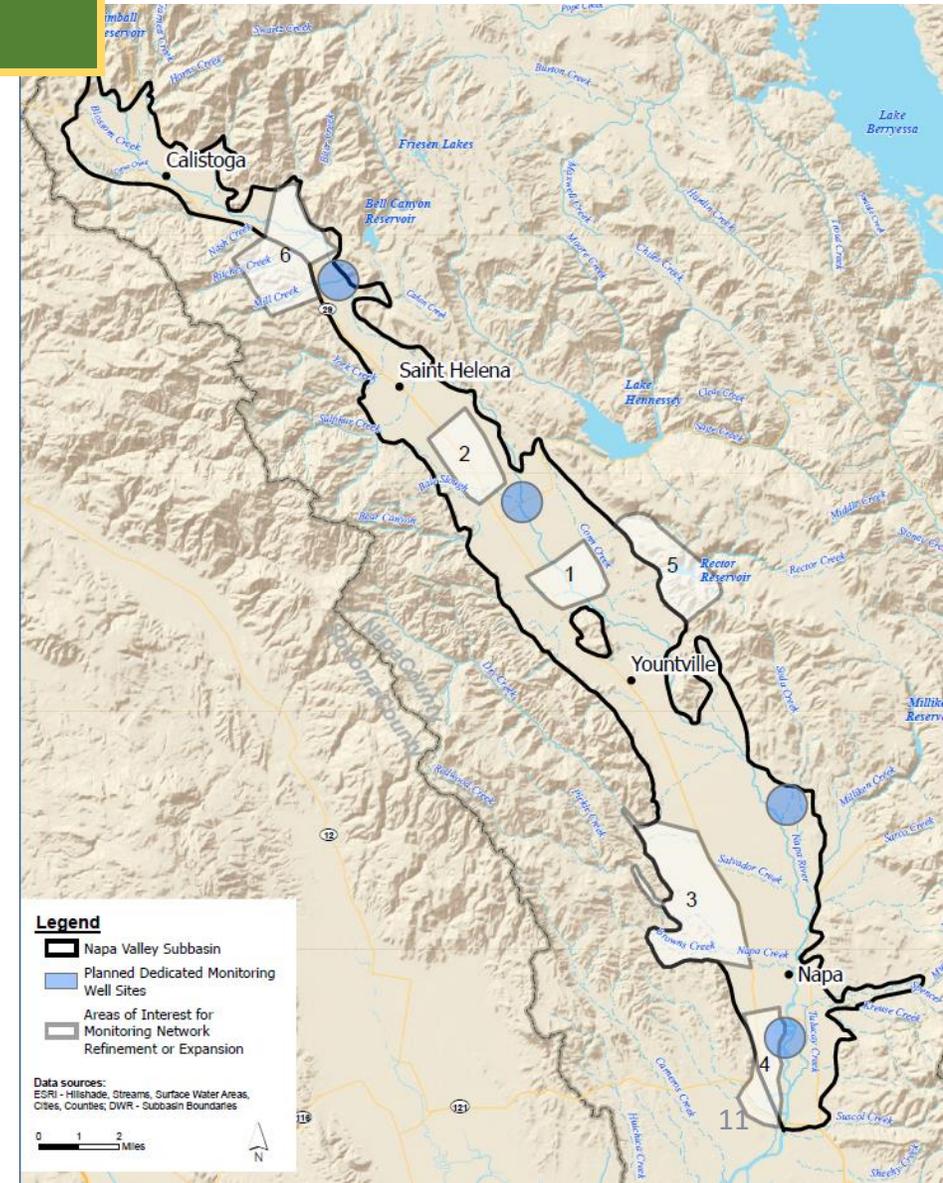
- Wells used to calculate storage must:
 - Be screened within the alluvial aquifer.
 - Must represent stable water level conditions, i.e. no recent pumping at or near the well.
- Groundwater Levels for Storage
 - In Spring 2023, 32 wells met criteria for estimating groundwater storage.



Groundwater Levels – Data Gaps

Groundwater Storage

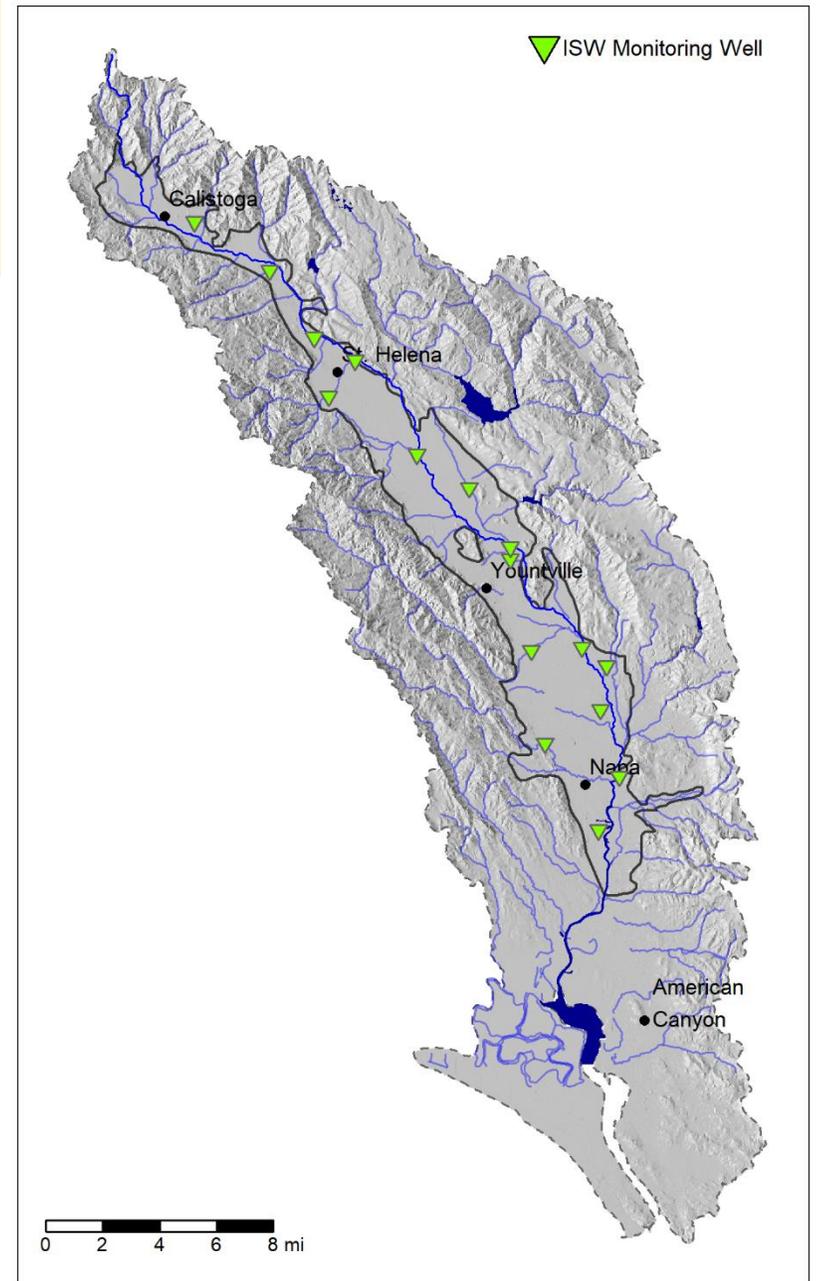
- Data Gap:
 - Six key areas were identified as data gaps within the GSP for spatial data gaps for calculating groundwater storage.
- Data Gap Addressed:
 - Data gaps were reduced by installation of dedicated monitoring wells and recruitment of new wells.
- Data Gap Updated:
 - Areas identified as 1, 2, and 5 remain areas where monitoring could be improved.



Groundwater Levels

Interconnected SW-GW

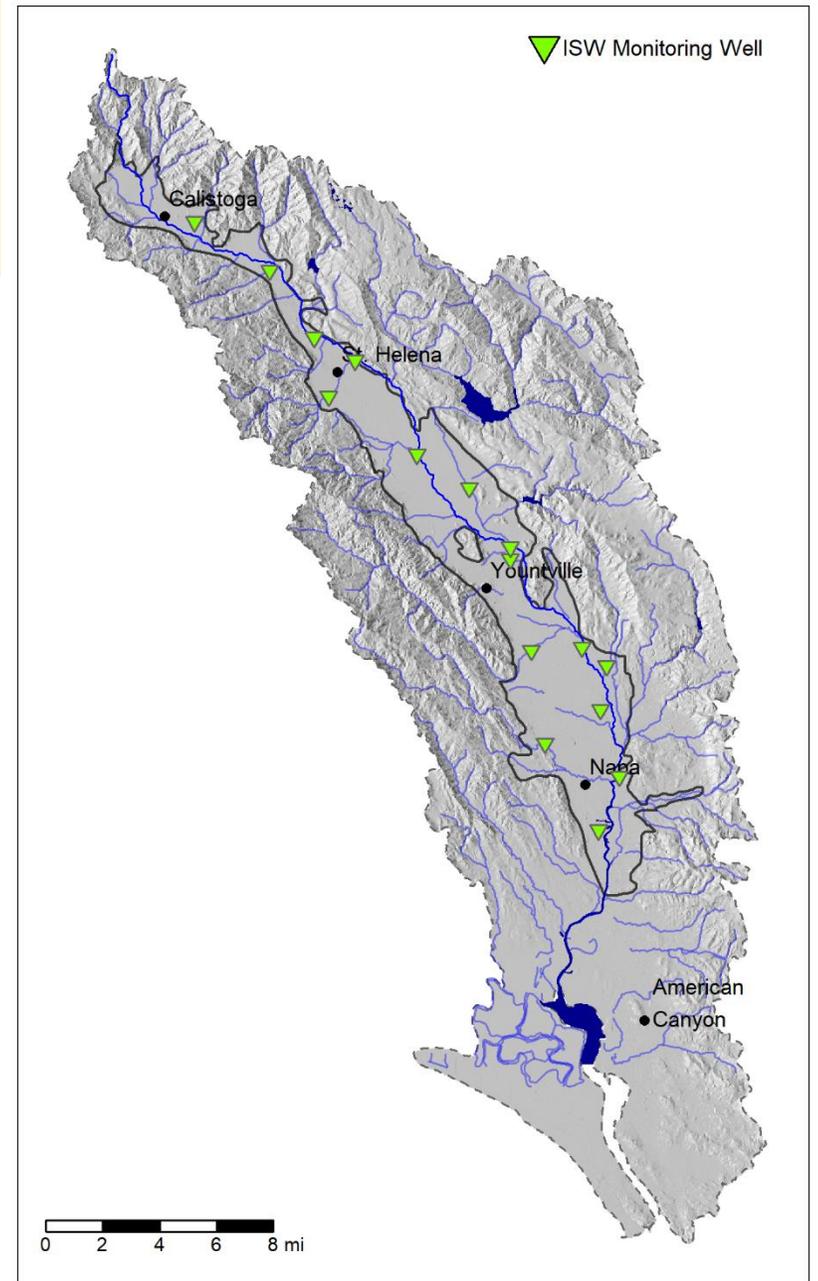
- Groundwater levels for ISW consisted of shallow wells near a river or dual-completion monitoring wells.
- Current monitoring network includes:
 - Dual-completion wells at 13 locations.
 - Three (3) shallow wells.



Groundwater Levels – Data Gaps

Interconnected SW-GW

- Data Gap:
 - The GSP identified the need for four (4) additional dual-completion monitoring wells, in addition to the five (5) existing monitoring wells.
- Data Gap Addressed:
 - The GSP data gap was addressed with the installation of eight (8) dual-completion monitoring wells and associated stream gages.
- Data Gaps Updated:
 - Additional low-flow discharge measurements will better characterize ISW, previously identified in the stream gage and discharge monitoring network.



Napa Valley Integrated Hydrologic Model (NVIHM)

Napa County Monitoring Networks

Groundwater Levels

Groundwater Storage

Land Subsidence

Stream Stage and Discharge

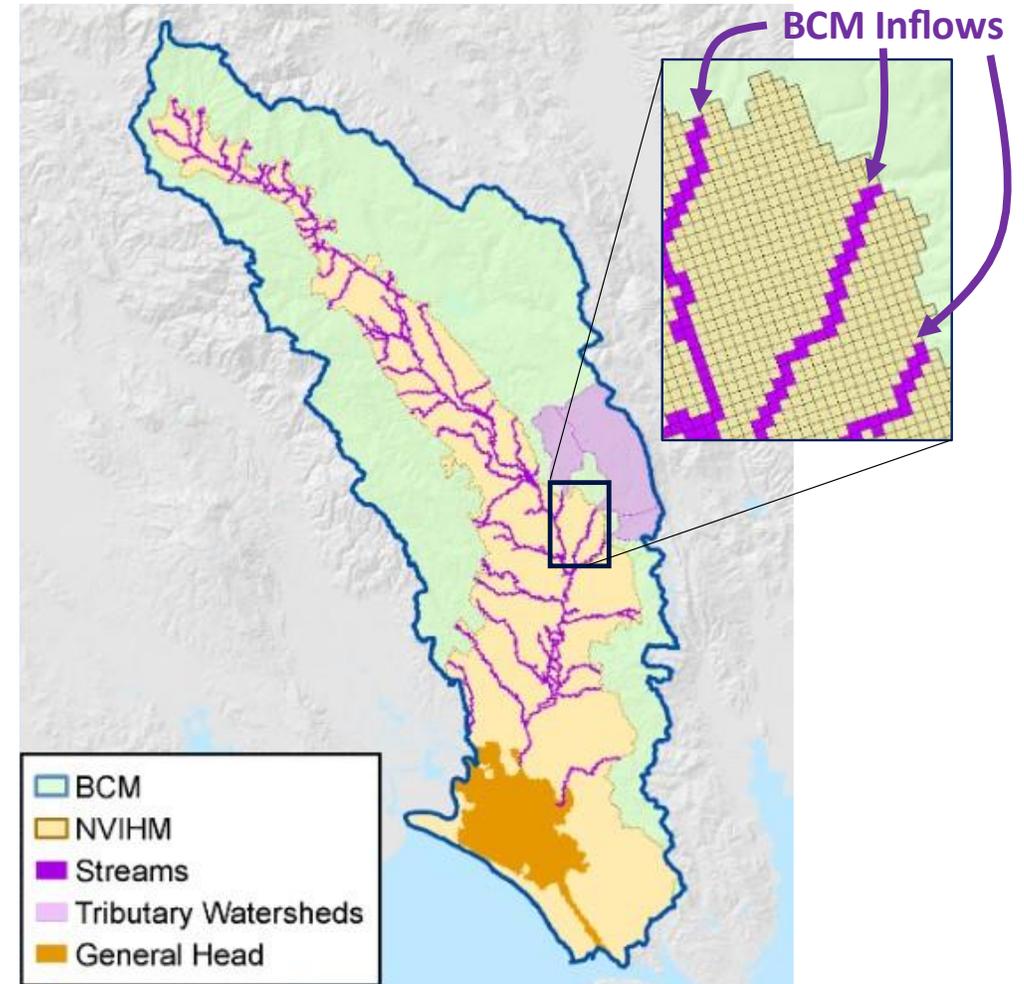
Interconnected SW-GW

GDE Monitoring

Groundwater Quality

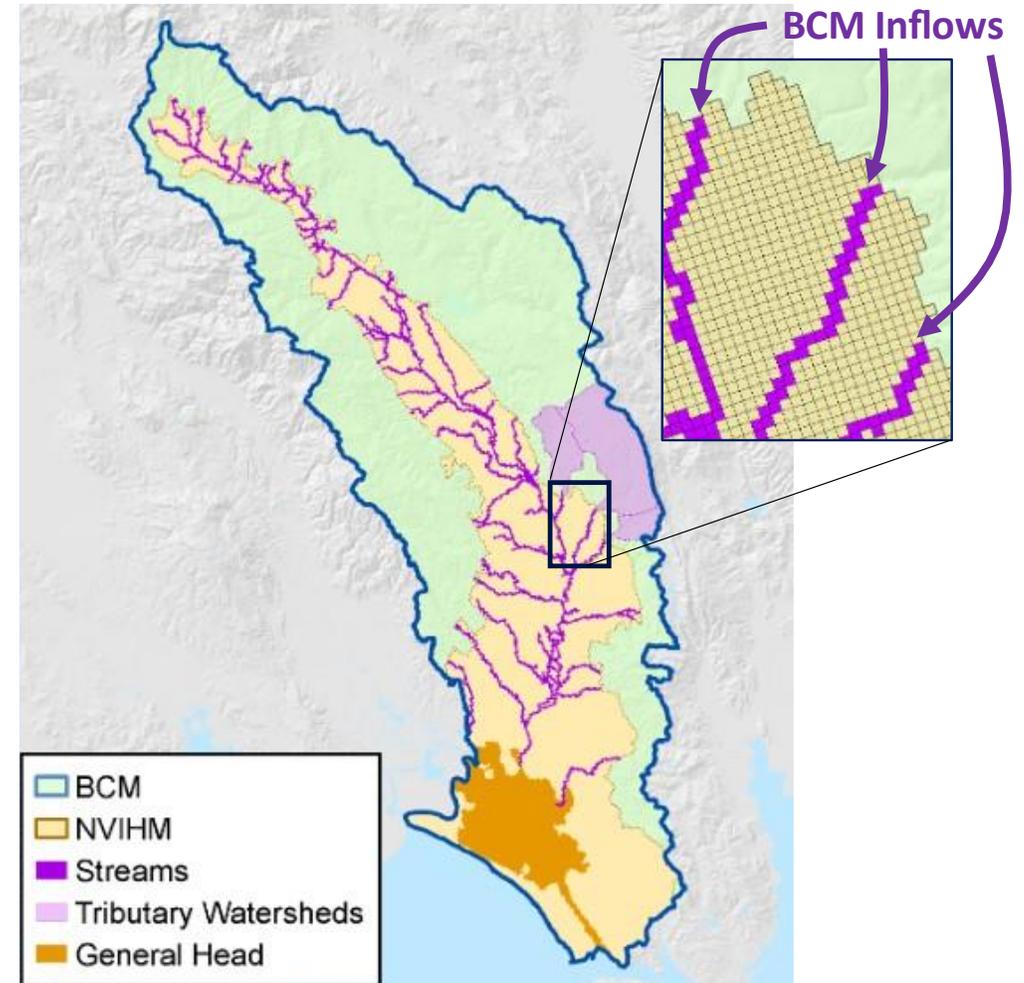
Seawater Intrusion

Surface Water Quality

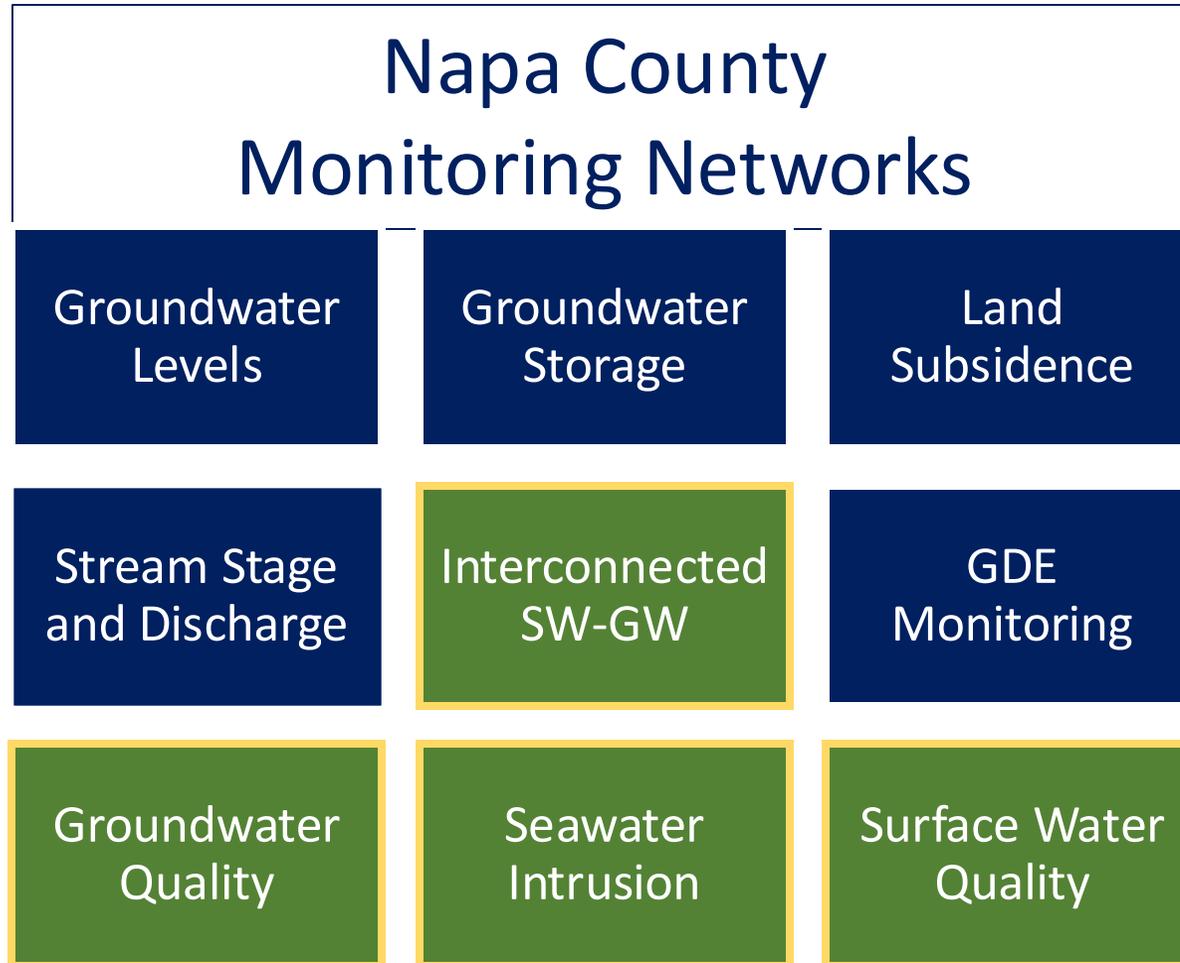


NVIHM – Data Gaps

- Model improvements to be presented at later TAG meetings.
- NVIHM will be used to investigate hydrogeologic conceptual data gaps.
 - Highly heterogenous Quaternary alluvium.
 - Extractions and interactions from older geologic units to alluvium.
 - Interactions between volcanic geologic units and alluvium.



Water Quality

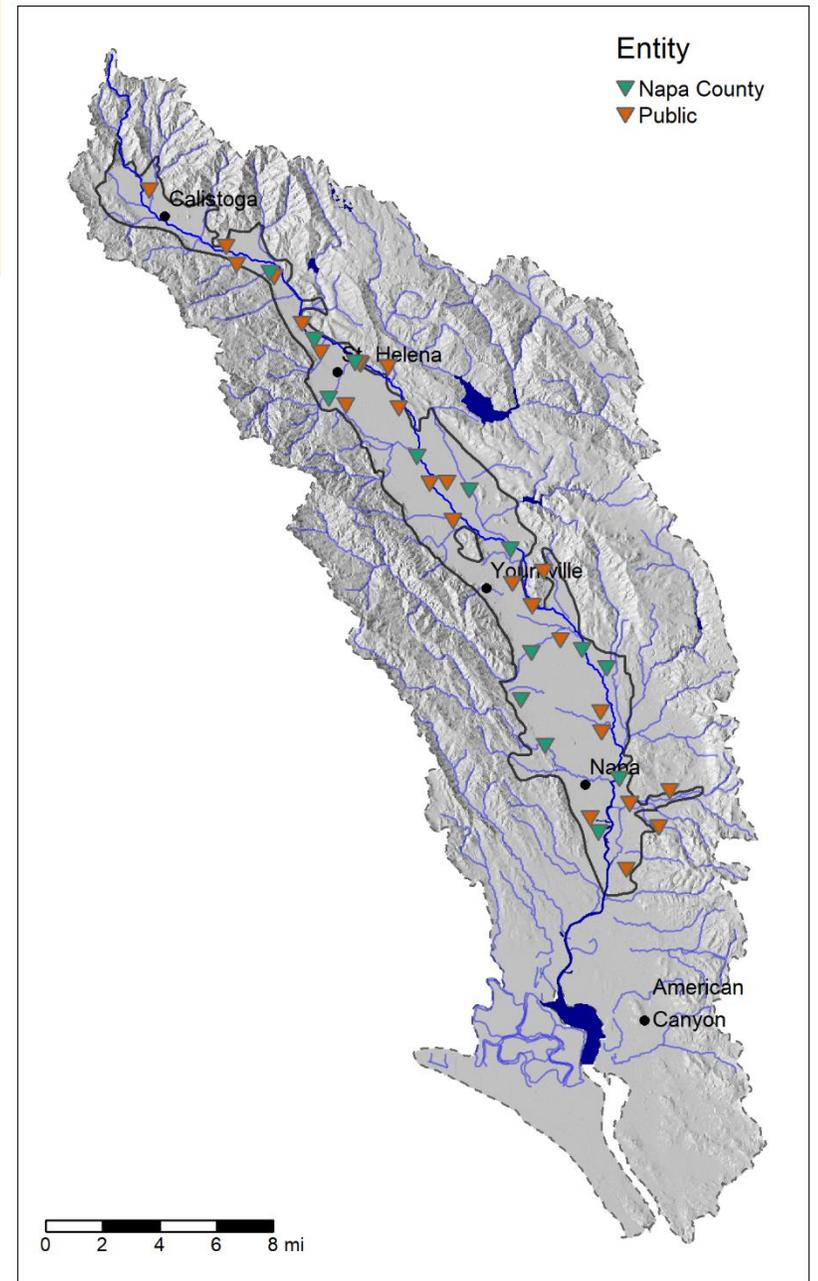


- Temperature and total dissolved solids are monitored at ISW locations. Influence of GW on SW inferred by these data.
- Due to the high level of connectivity of the GW and SW system, surface water quality is assessed at ISW sites.

Water Quality

Groundwater Quality

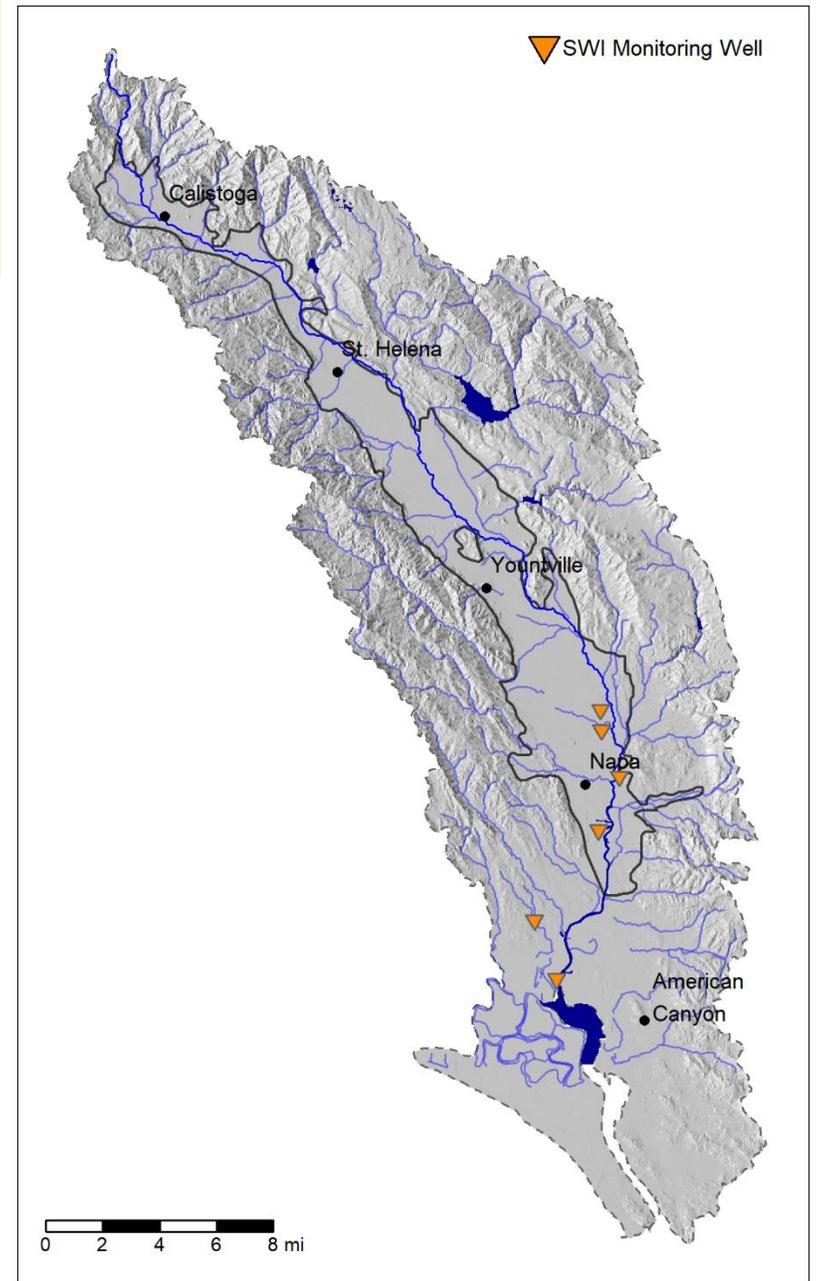
- SGMA-specific monitoring conducted by Napa County with additional data compiled from other monitoring networks, such as public water supply.
- Monitoring for constituents of concern, including arsenic, iron, manganese, and nitrates.
- Many metals are naturally occurring in the hydrothermal system and source rocks of Napa County.
- Based on monitoring, nitrates are not found in high concentrations in Napa County.



Water Quality

Seawater Intrusion

- Monitoring for seawater intrusion based on chloride, total dissolved solids, electrical conductivity, and sodium measurements.
- Within the Napa Valley Subbasin, groundwater pumping is limited by ISW sustainable management criteria.
 - Undesirable results would occur for other sustainable management criteria before increased seawater intrusion from pumping occurred.
- Important to monitor to evaluate groundwater impacts of climate change, sea level rise, and increased storm surges.



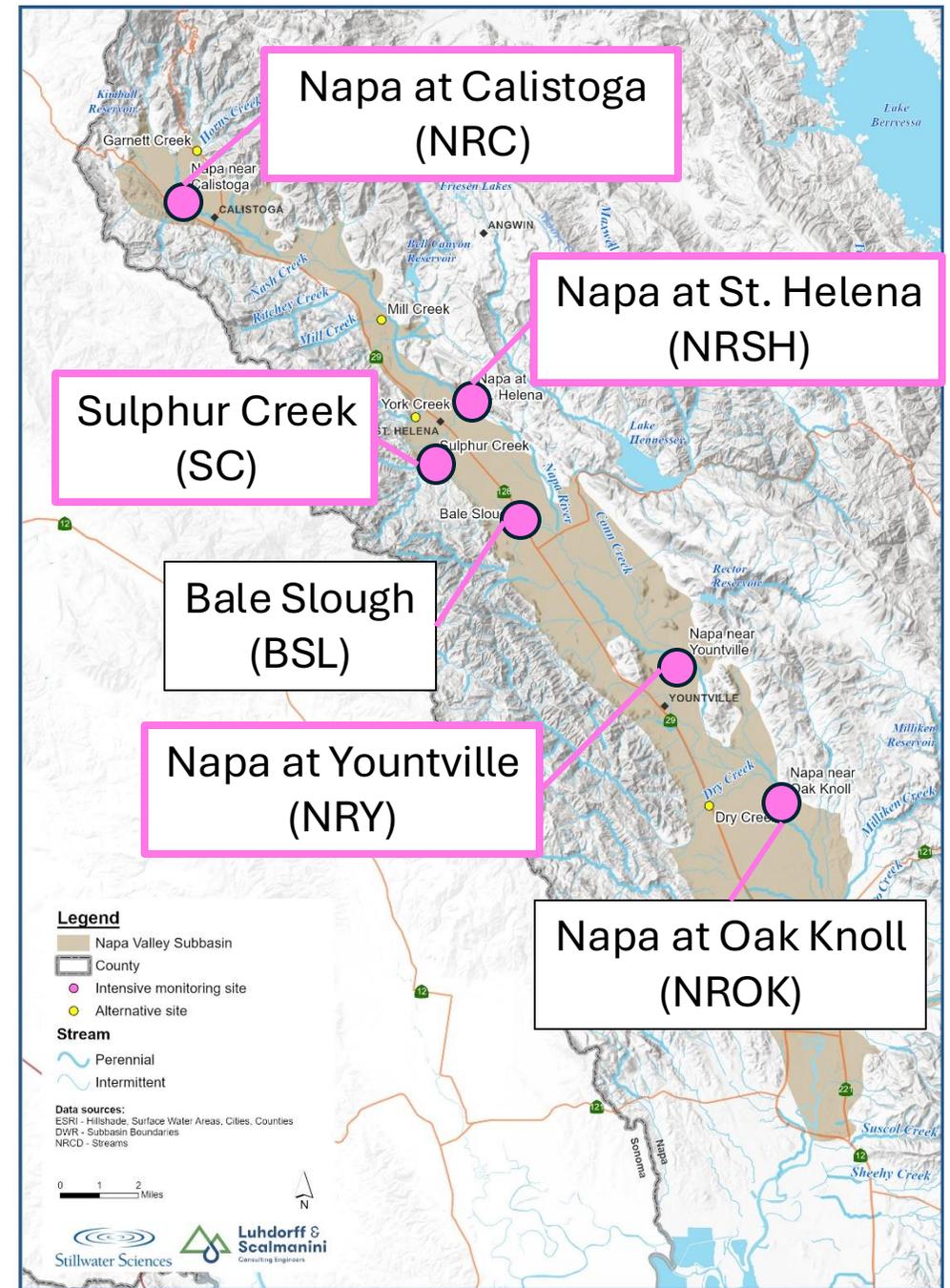
Groundwater Dependent Ecosystems

Napa County Monitoring Networks		
Groundwater Levels	Groundwater Storage	Land Subsidence
Stream Stage and Discharge	Interconnected SW-GW	GDE Monitoring
Groundwater Quality	Seawater Intrusion	Surface Water Quality

- The GSP identified two main data gaps:
 - Spatial distribution of shallow wells.
 - The development of a workplan that includes biological field assessments, review of existing data, investigate stream habitat conditions, and evaluation of listed species.
- Both data gaps have been addressed.

ISW and GDEs Workplan Implementation

- Six intensive survey sites identified in Workplan, initial surveys were conducted at 4 of the 6 sites
- Stillwater conducted reconnaissance visit and field visit to 4 of the sites on May 2024 with the Technical Team plus TAG member Matt Kondolf
- Napa River at Oak Knoll now approved
 - First round of surveys slated for fall 2024 and spring 2025
- Bale Slough – access pending



Biologic Surveys

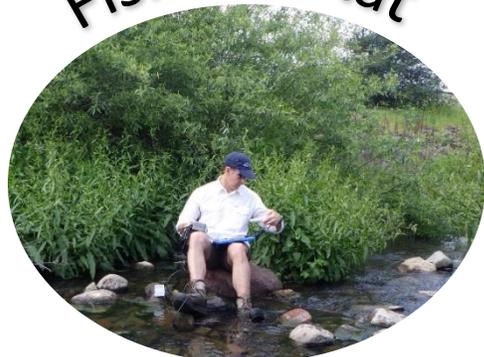
Fish Population



Terrestrial Wildlife (birds)



Fish Habitat



Aquatic Wildlife



Aquatic Wildlife



Vegetation/GDE Health



2024 Monitoring

LSCE

Stage Recorders deployed at new sites, continued shallow groundwater monitoring

RCD summer 2024

Dissolved oxygen and temperature monitoring

Flow connectivity monitoring

Assess fish habitat

Fish surveys

Stillwater

Conducted amphibian surveys at 4 of 6 sites

GDE health surveys in late summer

California freshwater shrimp surveys (Calistoga reach)



2024 Survey schedule

Survey	May	Jun	Jul	Aug	Sep	Oct
Recon trip	NRC, NRSH, NRY, SC					
Flow Connectivity		NRC, NRSH, NRY, SC	NRC, NRSH, NRY, SC	NRC, NRSH, NRY, SC	NRC, NRSH, NRY, SC	NRC, NRSH, NRY, SC, NROK
Water Quality		NRC, NRSH, SC	NRC, NRSH, SC	NRC, NRSH, NRY , SC	NRC, NRSH, NRY, SC	NRC, NRSH, NRY, SC, NROK
Fish habitat		NRC	NRY, NRSH, SC			
Fish surveys		NRC, NRSH	NRY, SC			
Aquatic Wildlife	NRC, NRSH, NRY, SC		NRC NRSH, NRY, SC (eDNA+ shrimp)			

NRC-Napa River Calistoga
NRSH-Napa River St.
 Helena
NRY-Napa River Yountville
SC-Sulphur Creek
NROK-Napa River at Oak
 Knoll

- Completed Monitoring
- Planned Monitoring
- No Monitoring



Fish habitat and fish usage

- One snorkel survey conducted at each of the four sites in summer 2024
- Habitat mapping at each of the four sites
- Dissolved oxygen and temperature monitoring at each site
- Monthly flow connectivity surveys to assess habitat extent



Herpetology surveys

- Two visual encounter surveys and one eDNA sample for foothill yellow-legged frog and Northwest pond turtle at Sulphur Creek, Napa River at Calistoga, Napa River at St. Helena, Napa River at Yountville.
- Other sites will be surveyed in 2025

eDNA sampling at the Napa River near Calistoga

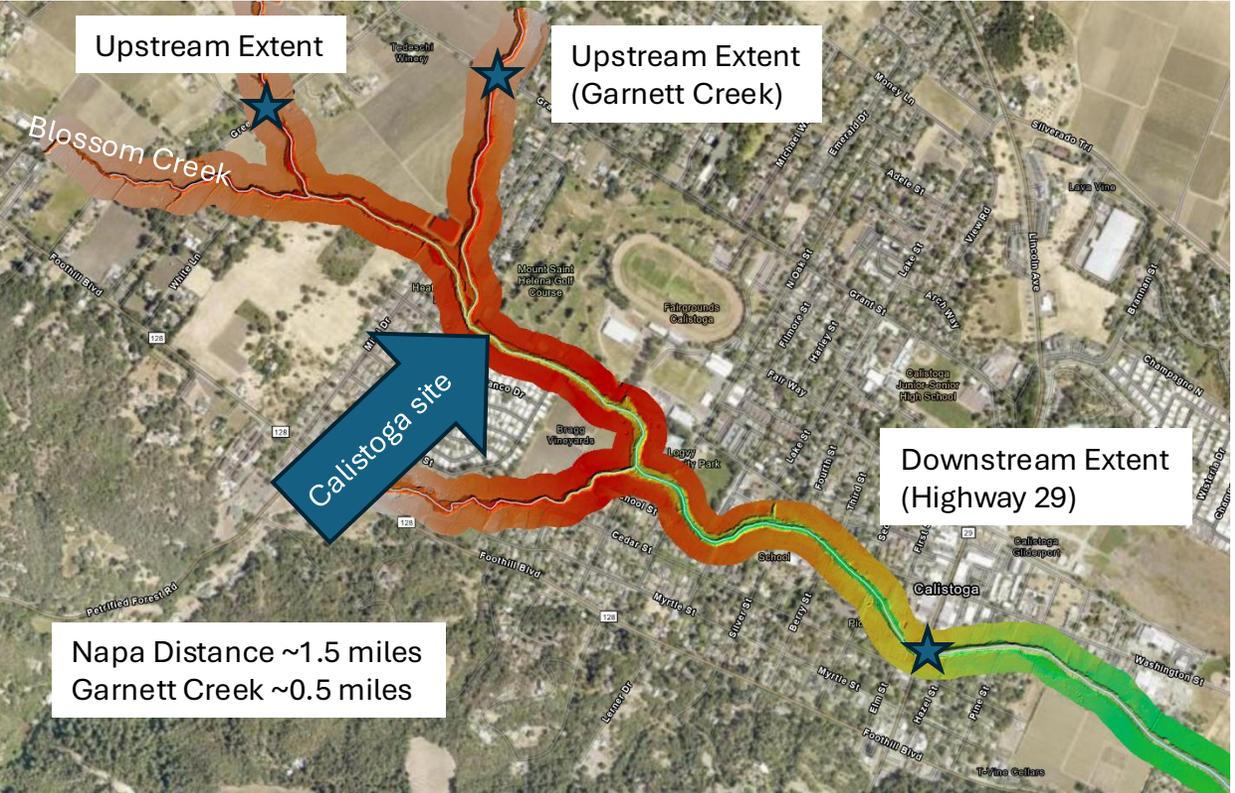


Visual encounter surveys



California Freshwater Shrimp

- Surveyed August 2024
- Napa River at Calistoga and lower Garnett Creek
- 100 shrimp were observed during the surveys in the Napa River distributed throughout the reach



Preliminary Results

- Observed foothill yellow-legged frog tadpoles and subadults in Sulphur Creek and tadpoles and eggs at Napa at St. Helena
- Observed a steelhead redd at Calistoga site
- Northwestern pond turtle basking at Yountville and St. Helena
- California freshwater shrimp throughout Calistoga reach



Egg mass



2025 Planned Surveys

RCD

- Redeploy dissolved oxygen and temperature sensors next spring/summer
- Continue habitat connectivity surveys

Stillwater

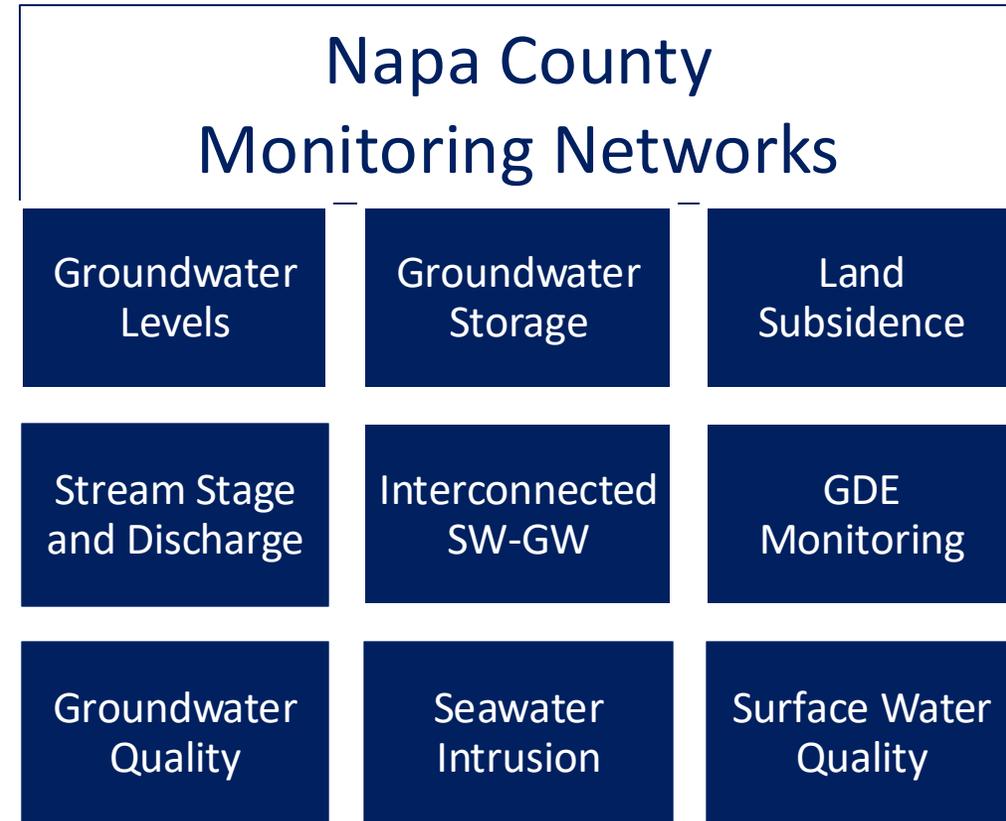
- Special status plants (spring 2025)
- Vegetation surveys (summer 2025)
- Birds (spring 2025)
- Amphibian surveys (spring/summer 2025)
- Shrimp surveys (summer 2025)
- CEFF analysis (starting fall 2024 through 2025)





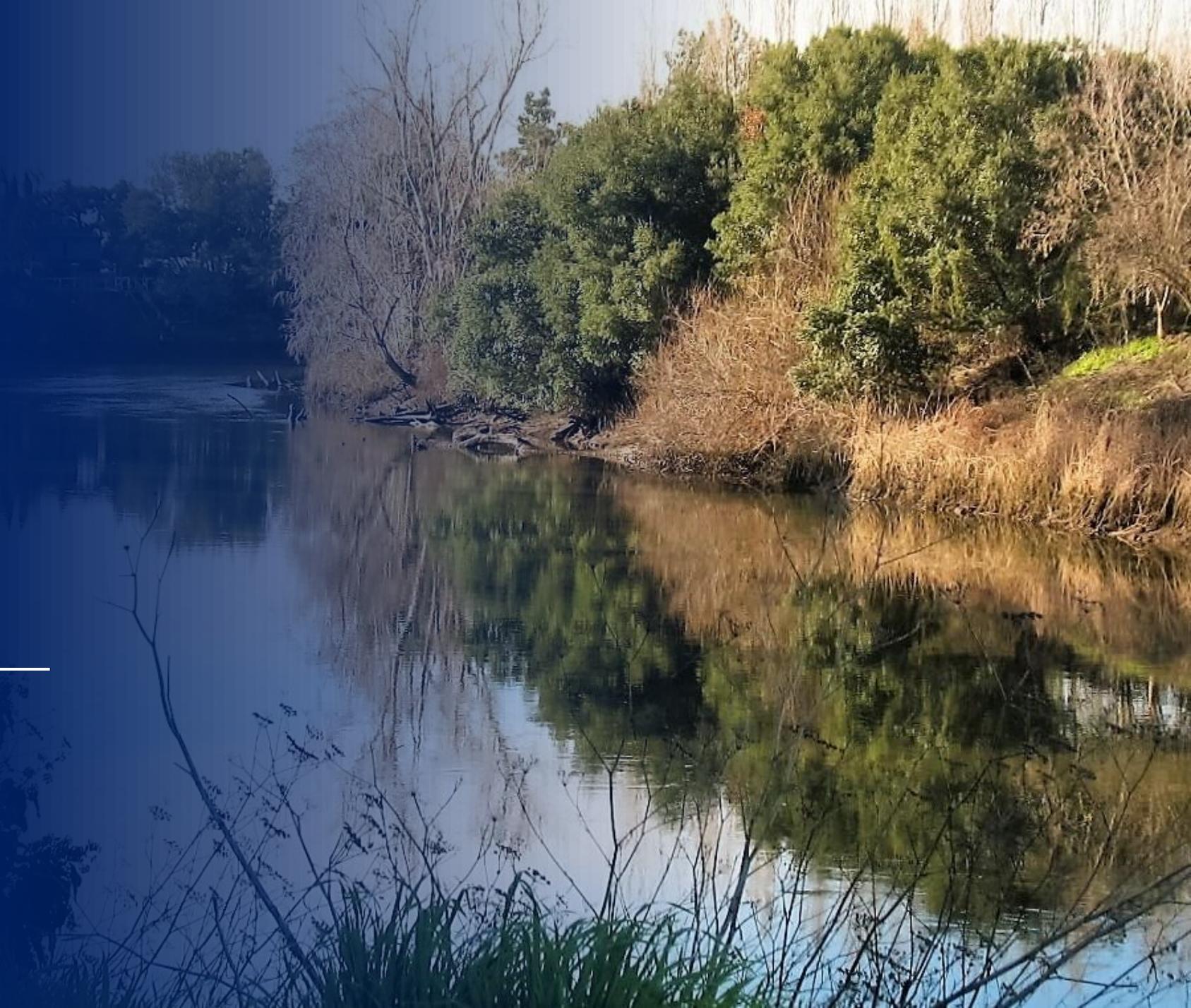
Napa County Monitoring

- Napa County has a long history of monitoring and investigating groundwater resources, surface water resources, and their interactions.
- Data gaps have been identified and addressed over the past decade.
- Data gaps are continually reviewed and updated based on our evolving understanding of the system and updates in the tools and technologies that can be used to address them.
- Data for the monitoring networks is used in conjunction with additional data, such as climate, remote sensing, evapotranspiration, and others, to measure and manage natural resources.





Questions and Discussion





Thank You

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